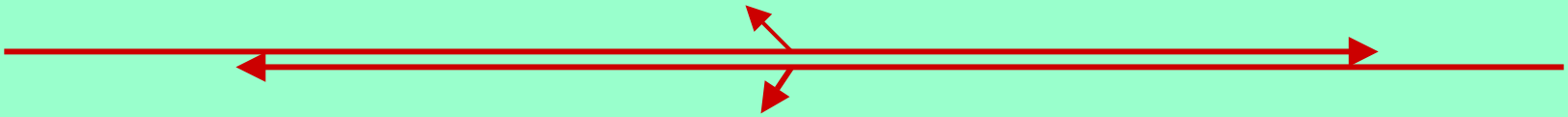

Triggering on Ultra-Peripheral Collisions

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for the
UPC group

Outline

- Physics
- 2000-2001 Triggers
- Looking ahead:
  - Detectors:
    - MWC
    - BBC, FTPC
    - EMC
  - L0, L2, L3

Physics

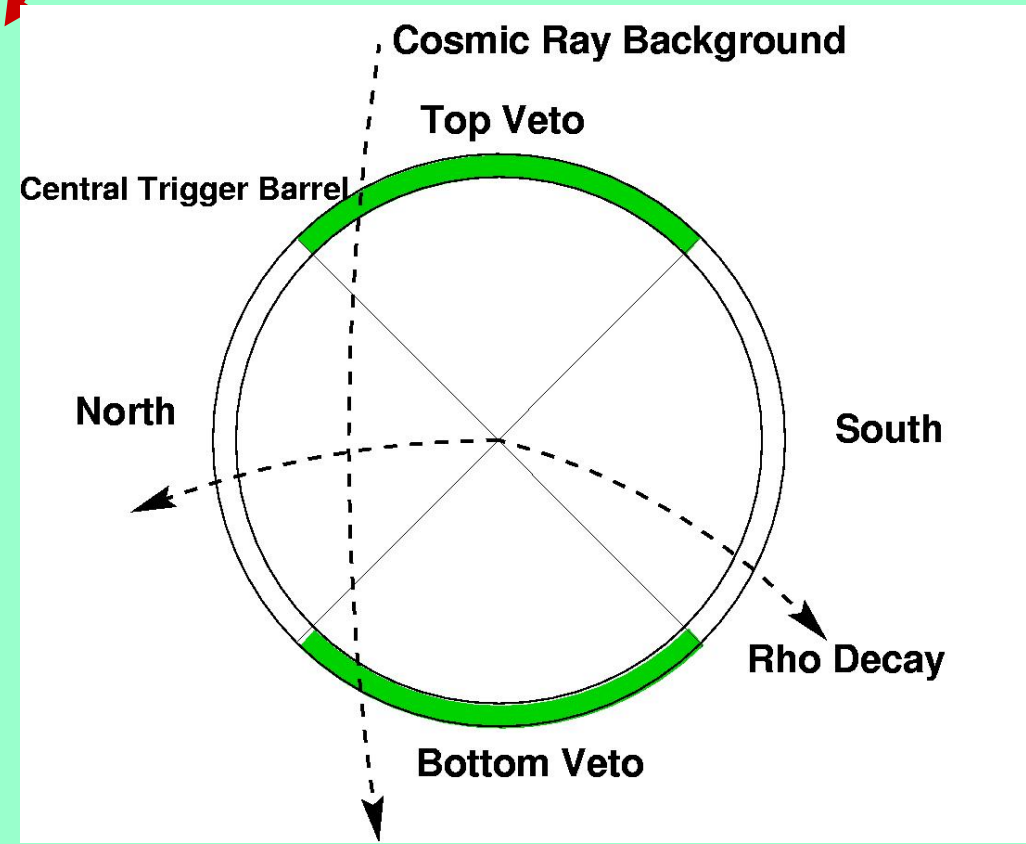
- Select: $AA \rightarrow \gamma P, \gamma\gamma, PP \rightarrow ee, \mu\mu, \rho, \phi$, etc
  - 2 prongs
  - More than 2 prongs
- Reject:
  - Beam gas
  - Cosmics
  - Peripheral Hadronic Events

Implemented L0 Triggers

- 2000: Topology (dedicated run)
- 2001:
  - UPC MinBias: MinBias without SVT (lower deadtime)
  - Production Central:
    - Topology
    - Topology and ZDC
    - ZDC downscaled (for normalization)

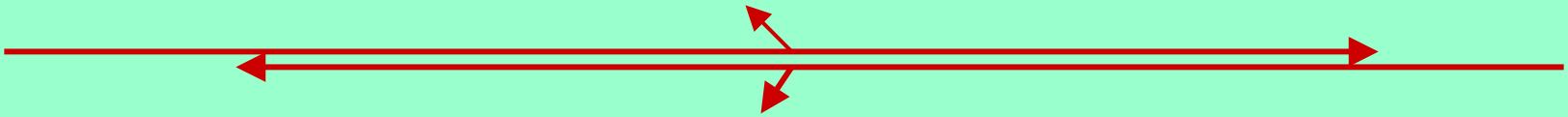
UPC Level 0 Topology Trigger

- Intended for 2 prong events
- Back to back hits in CTB
- Coincidence 1 North + 1 South hit
- Veto on top + bottom to reject cosmic rays.
- Rate 20-40 Hz
- Dedicated run in 2000, and parallel (with central) in 2001.



UPC L3 Algorithm

- Selection:
  - Multiplicity < 100
  - Good Tracks: N_{hits}>14 hits, x_{dca},y_{dca}<15 cm, z_{dca}<200 cm
  - 1< Number of Good Tracks < 15
- Rates: Input ~20-40 Hz, Output ~1-2 Hz
- ~5% events passing L3 are good ρ candidates: very loose cuts in L3. They could be easily tightened.



Future Plans

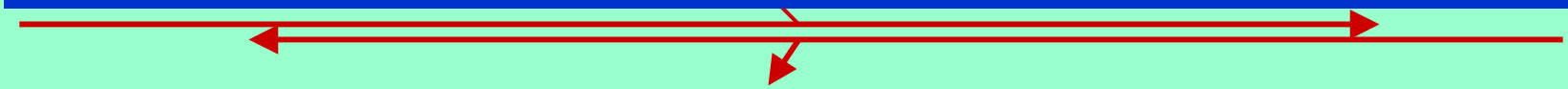
Other detectors

- Use fast detectors (MWC, BBC, EMC):
  - to trigger on low multiplicity if they overlap with a tracking detector
  - to veto activities in the areas where they do not overlap with a tracking detector.

BBC

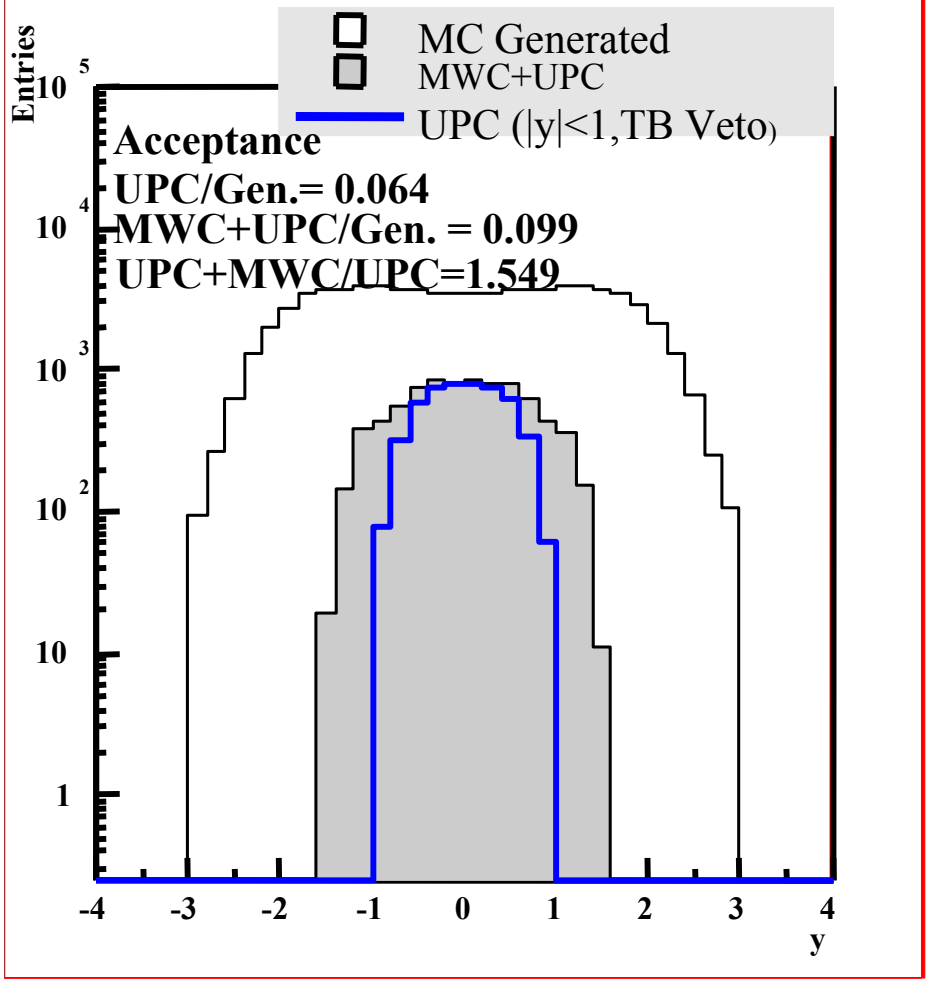
- As a veto:
  - BBC as veto combined with current topology trigger
  - It should be very efficient to get rid of beam-gas background. It will decrease topology trigger rate significantly.
- As a low multiplicity trigger:
  - Can be used to trigger on tracks going through FTPC, extend reach to low p_T and large rapidity tracks.
  - Pions (ρ, f_2), if some kind of dEdx available: e^+e^-, $\phi \rightarrow K^+K^-$, $K_S^0 K_L^0$ (?).
- Can be implemented in run control

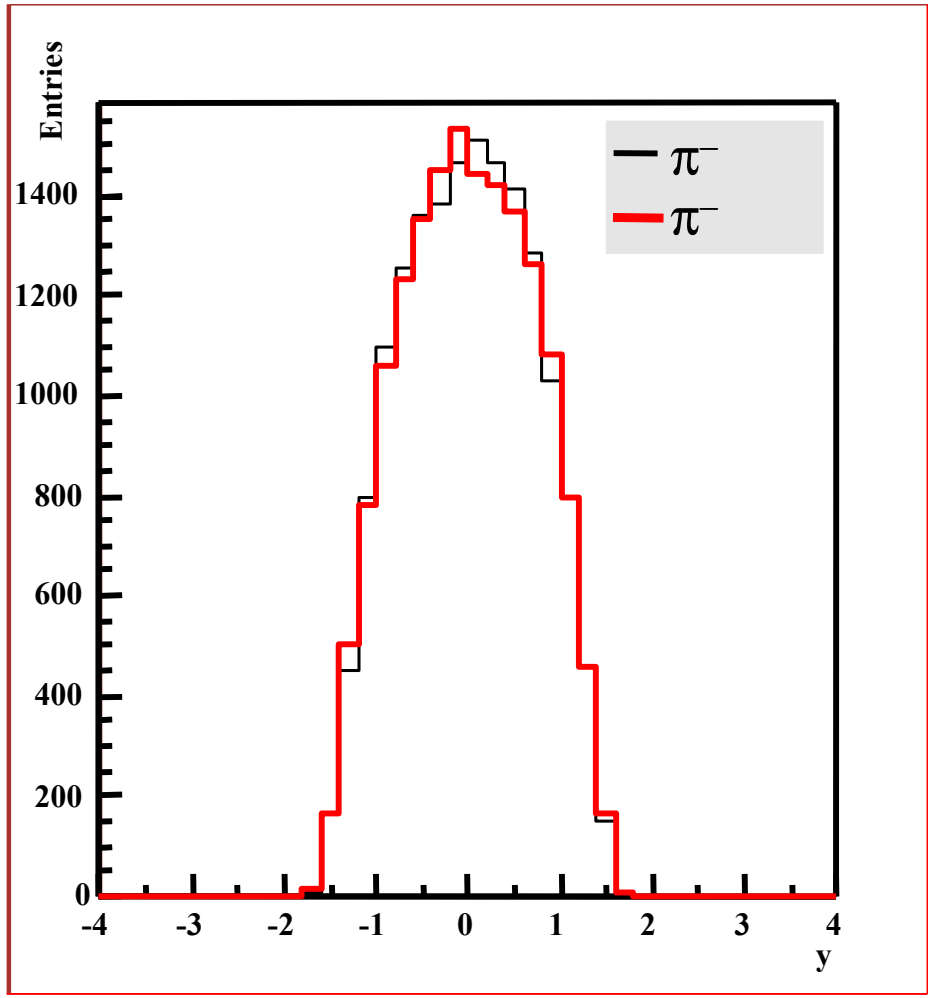
BBC/FTPC



- Use BBC-FTPC overlap to trigger on low multiplicity
- Use rest of BBC, MWC and CTB to veto.
- Need FTPC in L3 to reduce data volume on tape. Work on this has been started and should be available.

MWC


MC Generated
MWC+UPC
UPC (|y|<1,TB Veto)
Acceptance
UPC/Gen.= 0.064
MWC+UPC/Gen. = 0.099
UPC+MWC/UPC=1.549
Entries
y


Entries
π⁻
π⁻
y

MWC

- How to use it:

  η=1-1.5 as low multiplicity trigger

  η=1.5-2.0 as veto, since no tracking available in this region

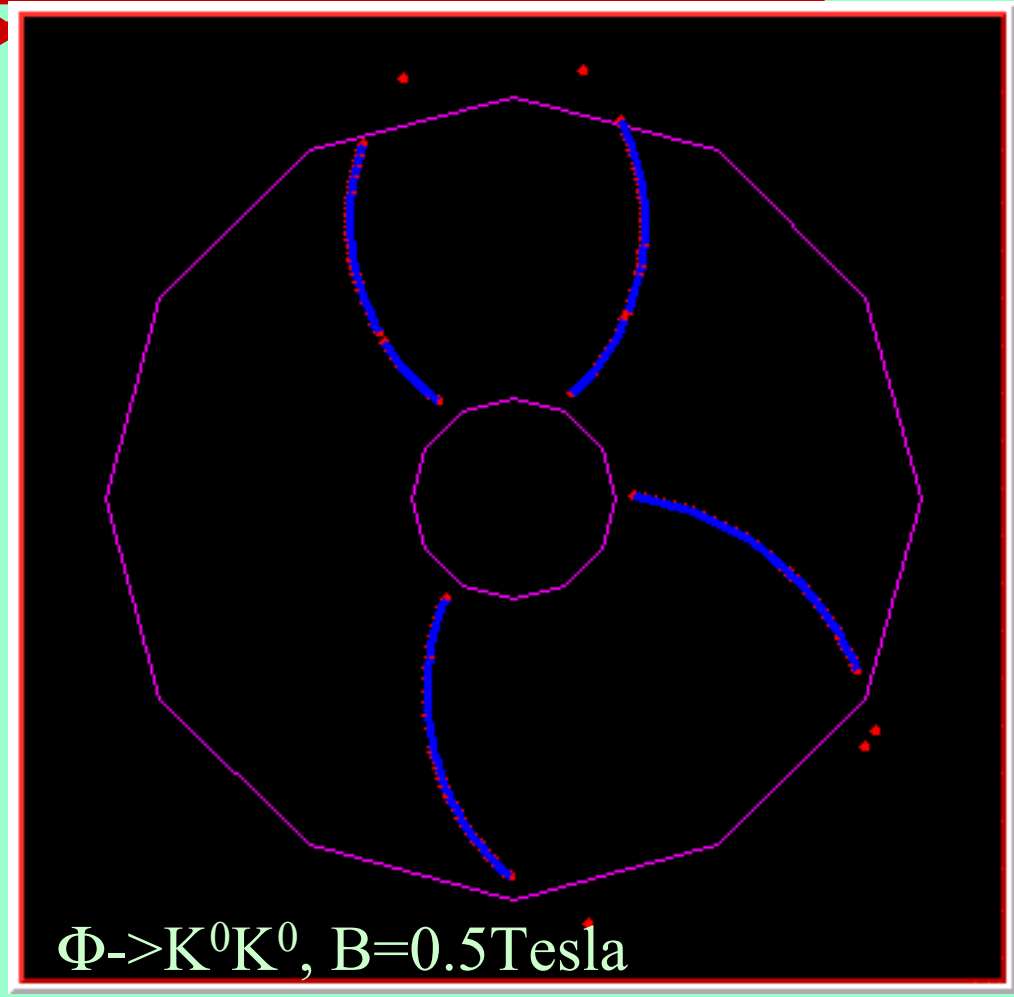
- Integration η=1-1.5 into quadrant sums.
- Possible scheme (T=Top,B=Bottom):
  - Reject: TCTB-BCTB, TCTB-BMWC, TMWC-BMWC
  - Accept: TMWC-BMWC

EMC

- Trigger on states decaying into π^0, e:
  - Cleaner $J/\Psi \rightarrow e^+e^-$
  - $\eta \rightarrow \gamma\gamma$
  - Cosmic rejection (?)
- Require:
  - Topology with EMC
  - Tower with $E > E_{thres}$ and total energy smaller than $n * E_{thres}$, $n \sim 2$. What is the minimum EMC threshold?
  - Match CTB and EMC in L2.

4-Prong Event Topology Trigger

- Current topology trigger would not be very efficient
- A modified algorithm will help: Allow top-bottom hits in combination with North-South



Plans/Ideas for L0/L2/L3

- L0: Expand topology trigger to 4 prongs.
- L2:
  - Back-to-Back trigger for heavy particles (J/Ψ,$f_2(1270)$)
    - Calculate transverse opening angle for two prongs
  - Match CTB and EMC in L2
- L3:
  - Incorporate FTPC, EMC
  - Tighten cuts

Scalers

- Crucial for luminosity and live time determination
- Needed for relative normalization of exclusive triggers.
- Must be read out frequently.

Conclusions

- Include in L0, L3:
  - MWC/BBC to expand rapidity acceptance and reject background
  - FTPC in combination with BBC
  - EMC
- Robust scalers needed for analysis
- Topology trigger to be expanded for 4 prongs, but needs study

Kaons from Φ→KK Kinematics